L6: Entry 6 of 7 File: USPT Jul 3, 2001

DOCUMENT-IDENTIFIER: US 6253980 B1
TITLE: Shared vehicle system and method with system for carrying a first vehicle with a second vehicle

Detailed Description Text (9):
A user desiring to obtain the use of a vehicle 16 arrives at a first port facility 14 and enters a request for a vehicle and other information into a computer system. The information may include the destination port or kiosk. The information may also include the additional distance and/or time that the user expects to travel beyond the normal distance and/or time to reach the destination port facility, for example, to conduct errands or other excursions. The information may further include user identification information, for example, read from a card key 21, smart card, magnetic strip, fingerprint, retinal scan or other machine-readable method of identification.

Detailed Description Text (10):
In a preferred embodiment, described with reference to the system in FIG. 1 and the flow chart of FIG. 2, a user enters identification information by swiping a card key 21 (or other machine-readable token) past a reader, step 22. The information is received by the system in step 24 and, in step 26, the user enters travel information (such as destination, added distance and/or added time) with a keyboard, touch-screen, mouse or other suitable user interface. In step 27 the availability of a vehicle is checked, and if a vehicle is available step 28 follows, if not step 40 will be next.

Detailed Description Text (11):
In the present preferred embodiment, the computer system at the port facility 14 is programmed to prompt the user to enter the above-noted travel information, upon the user registering by swiping the card key 21 (or other token) past the reader. The computer system may display destination options and/or additional time or distance options. Thus, the display may prompt the user to, for example, select or click an icon for a proposed destination port facility. In addition other icons for selecting a proposed additional number of minutes or miles of expected travel beyond the route to the destination port may be displayed. By selecting the additional icons the user may inform the system that the user will have an errand trip. An errand trip is a detour from the regular route that would be taken in traveling between points. For example a user of a vehicle may travel directly to a destination or they may take a side excursion for example to pay a bill or to buy a newspaper. Such side excursions are errand trips. The user can select different icons notifying the system that, for instance an errand trip will take an additional 45 minutes and add an additional 10 miles beyond what would be expected if the direct route to the destination were taken without the errand trip. In yet further embodiments, a map is displayed to the user and the user is prompted to identify locations on the map corresponding to a destination and/or side trip locations or zones. It can be very important to the scheduling and allocation of vehicles to allow for excursions such as errand trips. Efficient allocation of vehicles is easier if vehicle trips can be predicted with greater reliability and accuracy. Embodiments of the vehicle sharing system and method include implementations which reward users for accuracy, for example if the user returns the vehicle within 5 minutes of the planned return time the user may get an "accurate return time" discount. Users may also get a discount if they give notice of unexpected delays. For example if the users were charged a per hour rate a user would be charged for a whole hour if they returned a vehicle 10 minutes late, whereas if they gave notice of their late return, so that the vehicle could be reallocated during the proper time frame, they might be charged for only a portion of an hour. Similar

discounts might be given for accurately predicting the number of miles driven. By accurately predicting the distance to be driven the system could more accurately predict, at the beginning of a trip, the state of charge (for electrical vehicles) that will be present when a vehicle is returned, thus enabling more efficient allocation of vehicles and charge facilities.

Detailed Description Text (24):
According to another aspect of the present invention, systems and methods for sharing vehicles involves controlling access to each allocated vehicle, so that access is allowed only for the user to whom the vehicle had been allocated. Security measures are implemented with the use of card keys (or other suitable machine-readable tokens) and personal identification numbers (PINs) issued to each user. Thus, according to this aspect of the invention, a user registers at a port facility, such as by swiping a card key (or other token) or by entering identification information through other suitable user interface means, such as described above with respect to step 22 of FIG. 2, and a vehicle is selected by the central facility. If the vehicle fleet includes electric powered vehicles, then the selection of the vehicle is preferably performed in accordance with the above described vehicle selection and allocation aspect of the invention. However, other embodiments may employ other suitable selection routines.

Detailed Description Text (26):
Meanwhile, the user walks to the vehicle, such as in step 38. With reference to the flow chart of FIG. 3, if the user arrives at the vehicle within the preset time period, such as five minutes, the user then enters identification information, for example, by swiping a card key (or other machine-readable token) past a reader mounted on the selected vehicle, step 62 in FIG. 3. In preferred embodiments, the card key (or token) is the same card key (or token) used during the user registration at the port facility. If the identification information (card key or token) is not read by the reader within the preset time period, then the user identification routine is disabled on the vehicle subsystem, step 64 and the vehicle is designated as being available for further users, step 66.

Detailed Description Text (27):
If, on the other hand, the user's identification information (card key or token) is read within the preset time period, step 68, then the vehicle subsystem compares the stored identification information received from the central facility with the identification information entered by the user (read by the card or token reader), as shown in step 70. If the identification information does not match, then the user is denied access to the vehicle, step 72.

Detailed Description Text (28):
If the identification information received from the central facility matches the identification information (card key or token) entered by the user, then the user is allowed access to the vehicle, as shown in step 74 and a counter starts timing a preset time period, such as five minutes, as shown in step 76. In preferred embodiments, the vehicle subsystem employs an electronic door lock that is controlled to selectively unlock the vehicle, step 78, to allow access to the vehicle interior. In addition, counters within the vehicle subsystem are set and started for counting the number attempts of entering a personal identification number PIN, step 80, and for timing a preset time period by which a correct PIN must be entered, such as 200 seconds, step 82.

Detailed Description Text (30):
In one preferred embodiment both the user's identification data and PIN are read from a user's identification card and communicated to the vehicle to be allocated to the particular user. As soon as the user's identification data and PIN are communicated to the vehicle to be allocated to the particular user, an authorized user may drive the vehicle on a trip without any further communication between the vehicle and the central facility. Upon use of the proper identification card and entry of a correct pin within the vehicle, the vehicle is ready to drive. The identification card reader 242 may be located on a window as shown FIG. 13. The PIN entry is accomplished by means of an input and display device, which may be mounted in a center console within the vehicle as shown in FIG. 13. In another preferred embodiment, the determination of whether the entered PIN is correct or not is made at the central facility, for additional security. In this case the valid pin is not sent to the vehicle, instead

the user in the vehicle enters a PIN which is then sent to the central facility for validity determination. If the PIN is valid then the central facility sends a notification of valid PIN to the vehicle. In particular, the central facility 12 preferably includes or operates with a database, table, algorithm, number encoded on the user's identification card, or the like which associates each user's identification information (card key or token) with the user's personal identification number PIN. Accordingly, upon receiving the requesting user's identification information, the central facility 12 obtains that user's PIN, for example, by comparing the identification information with corresponding data base entries and reading PIN information associated in a database with the identification information. Furthermore, when the user enters a PIN in the user interface and display device in the vehicle, steps 86 or 100, the vehicle subsystem transmits the entered PIN to the central facility. The central facility then compares the PIN received from the vehicle subsystem with the PIN retrieved from the database, table, algorithm, user's identification card, or the like. If a sufficient match exists, then the user is considered to have entered a correct PIN. The central facility may then send an enabling command to the vehicle, acknowledging that a correct PIN has been entered at the vehicle and the vehicle may be driven. The correct pin can be maintained in the vehicle subsystem 18 for later identification of the user and enabling of the vehicle, even if the vehicle were not in communication with the central facility.

Detailed Description Text (31):
Accordingly, preferred embodiments provide multiple levels of security. A first level of security is provided by the fact that a valid ID card is required even to enter the port facility. A second level of security is provided by the requirement that a user must proffer the proper identification at the kiosk 14 to be assigned a vehicle. A third level of security is provided at the vehicle where the user must enter valid identification information (for example, by swiping a card key or token) to gain access to the vehicle. A fourth level of security is provided by the requirement that, once the user gains access, the user must input a PIN that corresponds to the same user associated with the identification information. Moreover, each of these entries must be made within a preset period of time. These multiple levels of security reduce the risk of unauthorized entry and unauthorized use or theft of the vehicles. Thus, users are provided with a more secure environment within the vehicles and the vehicle owners and system administrators are provided with a reduced risk of vehicle theft or misuse.

Detailed Description Text (44):
According to further aspects of the present invention, safety measures are implemented to address situations in which a legitimate user inadvertently enters the wrong PIN more than the allowed number of attempts, fails to enter the information within the preset time period, loses a card key or locks the card key inside of the vehicle. In the event that a legitimate user is inadvertently denied access to or enablement of a vehicle, then the user may contact the central facility by suitable means, including, but not limited to, telephone, portable Internet connection, or other communication device. Upon verification of the user's identity, the central facility transmits a command to the user's vehicle to instruct the vehicle subsystem to unlock and enable the vehicle for the user. If the user is at a remote location from the vehicle, for instance at a public telephone, the enablement command may have a delayed enabling effect in order to allow the user to return to the vehicle before it is enabled.

Detailed Description Text (52):
In operation, the horizontal leg 144 of member 132 is shaped to fit within and connect to the standard tow bar receptacle on the back of at least some of the fleet vehicles. The horizontal leg 146 of member 134 includes a key or pin receptacle aperture 148 and is configured to couple to an inverted "U"-shaped bracket mounted to the underside of the vehicle 16' to be carried. For example, FIG. 5 shows an inverted "U"-shaped bracket 150 mounted to the underside of a motorized two-wheeled vehicle. The bracket 150 defines a "U"-shaped opening for receiving the horizontal leg 146 of the member 134. Apertures 152 in the bracket 150 are positioned to align with aperture 148, upon the bracket 150 receiving the horizontal leg 146 of member 134. With the apertures aligned, the pin 154 may be inserted through the bracket 150 and leg 148, to secure the vehicle 16' to the carrier bracket 130. Accordingly the vehicle 16' may be carried by a vehicle 16, by simply connecting the leg 144 to the standard tow-bar receptacle of a vehicle 16, then placing the vehicle 16' on the horizontal leg 146 and inserting

the pin 154 through the apertures 148 and 152. Finally, the vehicle 16' may then be lifted by rotating the spool or reel 142 to take up some of the flexible band 140 and, thereby, draw the bracket 134 in the vertically upward direction. The raising and lowering mechanism just described may be replaced by a variety of lifting mechanisms known in the art. For example the lifting mechanism provided may be a hydraulic, pneumatic, rack and pinion, scissors and screw, or other mechanisms known in the art.

Detailed Description Text (59):
The computer subsystem 158 is preferably disposed in a well lit and highly visible location and, more preferably, is also housed within a building or enclosed structure 166 (as shown in FIG. 2), to which access is controlled for user security. Access may be controlled by an attendant stationed at the port facility 14 or by a standard lock and key system, wherein a key to the door 168 is issued to each user. However, in preferred embodiments, the door lock is controlled by a card key entry system and each user is issued a card key comprising a card on which magnetic, optical or other machine-readable data is recorded. In such systems, the enclosed structure 166 is provided with an electronic door lock 170 (FIG. 7) and a card reader 172 disposed in a user accessible location outside of the structure 166, for example, adjacent the door 168.

Detailed Description Text (60):
To gain entry to the structure 166, a user must swipe or insert the user's card key past or in the card reader 172, to allow data from the card to be read and communicated to the computer 160. The computer 160 is programmed to process the user ID and, provided user ID is in the database of currently valid users, controls the electronic door lock 170 to unlock the door 168 and allow the user to enter the structure 166. For example, the data may comprise a user identification code or an expiration date code and the computer 160 may be programmed to compare user identification code with a database of valid user identification codes or compare the expiration date code with the current date. Thus, the computer 160 may be programmed to unlock the door 172, only if the user identification code is valid or an expiration date has not passed.

Detailed Description Text (62):
The display and user interface 162 is provided to display instructions, prompts and information to the user and to allow the user to enter information, such as travel information and/or identification information, from the users ID card, for processing by the computer 160 or communication to the central facility 12. For added security, a second card reader (also represented by box 172 in FIG. 7) may be disposed within the structure 166, adjacent the display and user interface 162, for the user to enter card key data to initiate or continue interaction with the display and user interface 162. As described above, travel information and/or identification information entered by a user at a port facility 14 is communicated to the central facility 12 and is used by the central facility to select a vehicle for the user to pick up at the port facility 14.

Detailed Description Text (71):
The vehicle subsystem for enclosed vehicles also includes a card reader 196 mounted for access by a user from outside of the vehicle. Thus, for example, FIG. 6 shows a card reader 196 mounted to the inside of the passenger window, behind the driver's side door. To gain access to the vehicle selected for a user, the user must swipe the card key past the card reader, to allow the data recorded on the card to be read. The data read by the card reader 196 is provided to the processor 188 for comparison with data received from the central facility, through transmitter/receiver unit 190. The processor 188 is programmed to control an electronic door lock 198 to unlock one or more vehicle doors and allow access to the vehicle interior, upon a sufficient match between the compared data.

US Reference Patent Number (12):
5812070

US Reference Group (12):
5812070 19980900 Tagami et al. 364/423.098

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L6: Entry 2 of 7 File: PGPB Feb 21, 2002

DOCUMENT-IDENTIFIER: US 20020022979 A1
TITLE: System and method for the automated release of a vehicle to one of a plurality of different users

Summary of Invention Paragraph (10):
[0010] One or more variations on basic automated vehicle rental and car sharing systems appear in several other references, including U.S. Pat. No. 3,624,608 to Altman, U.S. Pat. No. 5,726,885 to Klein, et al., U.S. Pat. No. 5,812,070 to Tagami, et al., and U.S. Pat. No. 3,665,397 to DiNapeli, et al., and German Offenlegungsschrift DE-OS 22 10088. Several of these references are explicit applications of such systems to intra-urban settings. The systems are often contemplated as providing relief to parking demands within a specific urban area, and the use of the vehicles is restricted to that urban area.

Detail Description Paragraph (18):
[0062] Upon entry into the enabled mode 84, the local computer 24, via the keyless entry system 21, unlocks the vehicle's doors, and enables ignition 30. Control of locks and the ignition may be done in any conventional way, such as through electrical switching controlled by local computer 24. In some embodiments, the ignition switch may be a simple, keyless switch that operates exactly like a keyed switch, and in engaged state 72 the vehicle acts like a conventional vehicle except that no keys are provided. At times the user will wish to temporarily leave a vehicle 12 and lock it, without giving up the lease. With the vehicle remaining in the engaged state 72, the user exits the vehicle 12 and, in some embodiments, may select a lock option on interactive display 38. The user is prompted for a number or password for later reentry. Once the information is entered, the vehicle mode moves from enabled mode 84 to disabled mode 82. In disabled mode 82 the vehicle is locked and the ignition is disabled. The vehicle mode may be returned to enabled mode 84 by entry of the password, or the original credit card, driver's license information or both.

Detail Description Paragraph (19):
[0063] Alternatively, the ignition switch may be enabled by the local computer and the renter may use the vehicle's original pass key for starting the vehicle and regaining access thereto. Automobile pass keys are now typically provided with a resistor, transponder or microcircuit-containing chip which is matched to a receptor mounted in the ignition system and paired to the pass key. Conventionally, insertion of the pass key into the ignition switch typically completes a circuit which allows the vehicle to be started upon turning of the key in the ignition switch. The key may or may not be inserted in the ignition switch at the time of vehicle release to the user; if not, it may be stored out of sight by being inserted into an inconspicuous compartment inside the vehicle. This compartment may be provided with a slot into which the key is inserted, and with a receptor by which the key's insertion in the slot is verified. Providing the user with the pass key allows the user to gain reentry to the released vehicle without necessitating interaction with system interface 38, and until the lease is terminated the vehicle remains in its engaged state. With the pass key removed from the ignition switch, however, the vehicle may enter disabled mode 82 within engaged state 72. To terminate the lease, and ensure the key is returned with the vehicle, it is envisioned that the user be required to leave the pass key in the ignition switch, or in the above-mentioned slot, upon finally leaving the vehicle. Depending on the embodiment of the interface and/or ignition switch used, reminders to this effect may be displayed on the interface display in lease termination mode, or elsewhere on the vehicle. It is envisioned that alternative embodiments of the present

invention having no touch screen interface, discussed hereinbelow, would use a removable pass key.